A2 Review Key for Q2 T2

(*) Once the denominators are all the same, focus on the numerators to solve

1) $\frac{4}{x-1} = \frac{x+1}{12}$ LCD: $12(x-1)$

$\frac{4(12)}{12(x-1)} = \frac{(x+1)(x-1)}{12(x-1)} \rightarrow 48 = x^2 - 1 \rightarrow x^2 - 49 = 0$

$(x+7)(x-7)$

$x = -7, \; x = 7$

C

2) $\frac{3}{2x-1} = \frac{1}{3x-5}$ LCD: $(2x-1)(3x-5)$

$\frac{3(3x-5)}{(2x-1)(3x-5)} = \frac{1(2x-1)}{(2x-1)(3x-5)} \rightarrow 9x - 15 = 2x - 1$

$-2x + 15 \quad -2x + 15$

$7x = 14$

$x = 2$

3) $2x + \frac{5}{2} = \frac{3}{x}$ LCD: $2x$

$\frac{2x(2x)}{2x} + \frac{5(x)}{2x} = \frac{3(2)}{2x} \rightarrow 4x^2 + 5x = 6$

$4x^2 + 5x - 6 = 0$

$x = \frac{-5 \pm \sqrt{5^2 - 4(4)(-6)}}{2(4)}$

$x = \frac{-5 \pm \sqrt{121}}{8}$

$x = \frac{-5 \pm 11}{8}$

$\frac{-5+11}{8} = \frac{6}{8} = \frac{3}{4}$

$\frac{-5-11}{8} = \frac{-16}{8} = -2$

D

4) $\frac{7}{x} - 4 = \frac{-4x}{x+1}$ LCD: $x(x+1)$

$\frac{7(x+1)}{x(x+1)} - \frac{4x(x+1)}{x(x+1)} = \frac{-4x(x)}{x(x+1)}$

$7x + 7 - (4x^2 + 4x) = -4x^2$

$7x + 7 - 4x^2 - 4x = -4x^2$

$-4x^2 + 3x + 7 = -4x^2$

$+4x^2 \qquad +4x^2$

$3x + 7 = 0$

$-7 \quad -7$

$\frac{3x}{3} = \frac{-7}{3}$

$x = \frac{-7}{3}$

B

LCD = 6x

5) $\frac{1}{x} + \frac{1}{6} = \frac{1}{2}$

$\frac{6}{6x} + \frac{1x}{6x} = \frac{1(3)}{6}$

$6 + x = 3$

$-6 \quad -6$

$\boxed{x = -3}$

6) $\sqrt{x+11} + 1 = x$

$-1 \quad -1$

$(\sqrt{x+11})^2 = (x-1)^2$

$(x-1)(x-1)$

$x^2 - 1x - 1x + 1$

$x^2 - 2x + 1$

$x + 11 = x^2 - 2x + 1$

$-x - 11 \quad -x - 11$

$0 = x^2 - 3x - 10$

$(x-5)(x+2)$

$\boxed{x = 5}$ ✓ $\quad x = -2$ reject

Check: $x = 5$

$\sqrt{5+11} + 1 = 5$

$\sqrt{16} + 1 = 5$

$4 + 1 = 5$

$5 = 5$ ✓

$x = -2$

$\sqrt{-2+11} + 1 = -2$

$\sqrt{9} + 1 = -2$

$3 + 1 = -2$

$4 = -2$

No

7) $\left(\sqrt{x^2 - 3x + 3}\right)^2 = (1)^2$

$x^2 - 3x + 3 = 1$

$-1 \quad -1$

$x^2 - 3x + 2 = 0$

$(x-2)(x-1)$

$x = 2 \mid x = 1$

C

Check:

$x = 1$

$\sqrt{1^2 - 3(1) + 3} = 1$

$\sqrt{1} = 1$

$1 = 1$ ✓

$x = 2$

$\sqrt{2^2 - 3(2) + 3} = 1$

$\sqrt{1} = 1$

$1 = 1$ ✓

8) $\left(\sqrt{y-2}\right)^2 = (5)^2$

$y - 2 = 25$

$+2 \quad +2$

$\boxed{y = 27}$

check: $\sqrt{27-2} = 5$

$\sqrt{25} = 5$

$5 = 5$ ✓

9) $\sqrt{3x+2} - 4 = -6$

$+4 \quad +4$

$\sqrt{3x+2} = -2$ ← Square roots can't be negative

$x = \varnothing$

10) $\sqrt{7x+4} - \sqrt{2x+29} = 0$

$+\sqrt{2x+29} \quad +\sqrt{2x+29}$

$\left(\sqrt{7x+4}\right)^2 = \left(\sqrt{2x+29}\right)^2$

$7x+4 = 2x+29$

$-2x-4 \quad -2x-4$

$5x = 25$

$\boxed{x = 5}$

Check

$x = 5$

$\sqrt{7(5)+4} - \sqrt{2(5)+29} = 0$

$\sqrt{39} - \sqrt{39} = 0$

$0 = 0$ ✓

11) $3x^2 = 2x + 2$

$-2x-2 \quad -2x-2$

$3x^2 - 2x - 2 = 0$

$a = 3$

$b = -2$

$c = -2$

$x = \dfrac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-2)}}{2(3)}$

$x = \dfrac{2 \pm \sqrt{28}}{6}$

$\sqrt{28}$

$\sqrt{4}\sqrt{7}$

$2\sqrt{7}$

Divide all "outsides" by 2

$x = \dfrac{2 \pm 2\sqrt{7}}{6} \rightarrow \boxed{x = \dfrac{1 \pm \sqrt{7}}{3}}$

12) $y^2 - 4y - 7 = 0$
$+7 \quad +7$

$y^2 - 4y + \square = 7 + \square$

Half $-\frac{4}{2} = -2$
Square $(-2)^2 = 4$
Share

$y^2 - 4y + \boxed{4} = 7 + \boxed{4}$

$(y-2)^2 = 11$

$y - 2 = \pm\sqrt{11}$
$+2 \quad +2$

$\boxed{y = 2 \pm \sqrt{11}}$

13) $x^2 + 6x + 11 = 0$

$a = 1 \quad b = 6 \quad c = 11$

$b^2 - 4ac$

$6^2 - 4(1)(11)$

$36 - 44$

-8 ← Negative therefore they are imaginary

(A)

14) 10 is Positive so they are Real

10 is not a perfect square so they are Irrational

(C)

15) Real = Positive

Rational = Perfect Square

Equal = Means 0

(A)

16) $y = x^2 - 7x - 60$ Plug into calculator

$a = 1 \quad b = -7 \quad c = -60$ OR

$b^2 - 4ac$ $(-7)^2 - 4(1)(-60)$

$49 + 240$

Real → 289

Rational

Unequal

A

Unequal means it touches the x-axis twice

Rational means it touches at rational values

17) Imaginary roots = Doesn't touch the x-axis

B